APPENDIX I

Reliability Checklist and Water Quality Comparison

Reliability Checklist and Water Quality Comparison
Carnation Wastewater Treatment Facility
King County Department of Natural Resources and Parks

The appendix is designed to provide an indication of the general facility design requirements as set forth by the reclamation standards in terms of reliability and water quality. The appendix is not intended to provide an all-inclusive list of criteria, which must be met to use reclaimed water. The reliability checklist provides a comparison of the anticipated Carnation Wastewater Treatment Facility design against the requirements of the Washington Water Reclamation & Reuse Standards (Washington Department of Ecology, 1997).

Flexibility of Design	Required	Optional	Included	Deleted	Deferred to Design
Sufficient flexibility for convenience & efficiency in operations and maintenance	✓		**x**		

	Required	Optional	Included	Deleted	Deferred to Design
Alarm conditions					
Loss of power from normal power supply	✓		**x**		
Biological treatment process failure	✓		**x**		
Disinfection process failure	✓		**x**		
Coagulation process failure	✓			x	
Filtration process failure	✓			x	
Membrane process failure	✓		***x***		
Independence					
Alarms independent of normal power supply	✓		**x**		x
Personnel notified:	✓		**x**		x
Plant operator					
Superintendent					
Other: KCDNRP Regional Facility			**x**		x
Master alarm:					
Inter-connect all site alarms	✓		**x**		x
Location- convenient observation by attendant	✓		**x**		x
Less than 24 hour plant attendance:					
Alarms interconnected to	✓		**x**		x
Police station					
Fire station					
Other full-time service unit:			**x**		x

Reclamation Standards Reliability Requirements	Required[1]	Optional[2]	Provided	Deleted	Deferred to Design
Power Supply Reliability[3]					
Alarm and standby power source			**X**		X
Alarm & automatically actuated short term storage or disposal			**X**		X
Automatically actuated long term storage/disposal			**X**		X
Storage without alternative disposal system					
Retain reclaimed water under adverse weather conditions					
Wet weather conditions: Retain reclaimed water during 10-year storm as determined from on 20 years of weather data					
Minimum storage capacity: $V = 3 \times Q_{Ave\ Day}$					
Emergency Storage & Disposal					
Short-term emergency storage					
Facility reserved solely for reclaimed wastewater storage or disposal			**X**		X
Minimum of 24 hour storage period			**X**		X
All equipment provided with standby power or independent of normal power source			**X**		X
Pumping & pump-back equipment provided			**X**		X
Long term emergency storage					
Diversion to alternative, approved reuse site					
Diversion to discharge point approved by Department of Ecology					
Automatically actuated emergency storage provisions			**X**		
Provide all necessary sensors, instruments, valves & other devices for					
Fully automated diversion of untreated or partially treated effluent			**X**		X
Failure of treatment process			**X**		X
Manual reset to prevent automatic restart			**X**		X
Biological Treatment					
Alarm & multiple treatment units capable producing oxidized wastewater with one unit inoperable		✓	**X**		
Alarm & short-term storage/disposal provisions with standby replacement equipment		✓			
Alarm & long term storage or disposal		✓			
Automatically actuated long-term storage or disposal provisions		✓			
Membrane Separation			***x***		
Multiple membrane modules capable of treating the entire flow with one unit inoperable		✓	**X**		

[1] Required reliability features must be provided even if optional reliability features are provided unless approved by the regulatory agencies.
[2] Optional reliability features: one or more can be provided in addition to required reliability features.
[3] Provide at least one reliability feature.

Reclamation Standards Reliability Requirements	Required[1]	Optional[2]	Provided	Deleted	Deferred to Design
Secondary Sedimentation				**x**	
Multiple sedimentation units capable of treating the entire flow with one unit inoperable		✓			
Standby sedimentation unit process		✓			
Long term storage or disposal provisions		✓			
Coagulation				**x**	
Standby by feeders	✓				
Adequate chemical storage & conveyance facilities	✓				
Adequate reserve chemical supply	✓				
Automatic dosage control	✓				
Alarm & multiple treatment units capable producing oxidized wastewater w/1 unit inoperable		✓			
Alarm & short-term storage/disposal provisions with standby replacement equipment		✓			
Alarm & long term storage or disposal		✓			
Automatically actuated long-term storage or disposal provisions		✓			
Filtration				**x**	
Alarm & multiple filter units capable treating the entire flow with one unit inoperable		✓			
Alarm & short-term storage/disposal provisions with standby replacement equipment		✓			
Alarm & long term storage or disposal		✓			
Automatically actuated long-term storage or disposal provisions		✓			
Alarm & standby filtration unit process		✓			
Ultraviolet Disinfection					
Standby UV Module	✓		**x**		
Continuous UVT and power monitoring	✓		**x**		
Alarm & standby UV Module		✓	**x**		
Alarm & short-term storage/disposal provisions with standby replacement equipment		✓	**x**		
Alarm & long term storage or disposal		✓			
Automatically actuated long-term storage or disposal provisions		✓			
Independent power source		✓	**x**		
Chlorine Disinfection				**X**	

See Appendix I of the Washington Water Reclamation & Reuse Standards (Washington Department of Ecology, 1997) for additional general use area requirements including signage, use, cross-connections, aesthetic issues, and public health protection practices.

Water Quality Monitoring Comparison	General Class A Reclaimed Requirements		Additional Requirements to Stillwater Wildlife Area		CWWTF
	Sample Type & Frequency	Compliance	Sample Type & Frequency	Compliance	Corresponding effluent requirements for discharge to the Snoqualmie River
Biochemical Oxygen Demand (BOD_5)	24-hour composite, collected at least weekly	Shall not exceed 30 mg/L determined monthly, based on the arithmetic mean of all samples collected during the month	*Same as Class A requirement.*	Shall not exceed 20 mg/L on an average annual basis. *Also subject to TMDL limitations due to hydraulic continuity with the Snoqualmie River (see CWWTF effluent limitations).*	The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken. The average monthly effluent concentration shall not exceed the more stringent of 1) 15 percent of the respective monthly average influent concentrations or 2) Non-TMDL Seasonal Limitations (Nov - Jul): • Avg monthly of 30 mg/L, 155 lb/day • Avg weekly of 45 mg/L, 233 lb/day TMDL Seasonal Limitations (Aug to Oct): • Avg monthly of 30 mg/L, 25 lb/day • Avg weekly of 45 mg/L, 233 lb/day
Total Suspended Solids (TSS)	24-hour composite, collected at least daily*	Shall not exceed 30 mg/L determined monthly, based on the arithmetic mean of all samples collected during the month	24-hour composite, collected at least weekly	Shall not exceed 20 mg/L on an average annual basis *Also subject to TMDL limitations due to hydraulic continuity with the Snoqualmie River (see CWWTF effluent limitations).*	The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken. The average monthly effluent concentration shall not exceed the more stringent of 1) 15 percent of the respective monthly average influent concentrations or 2) • Avg monthly of 30 mg/L, 155 lb/day • Avg weekly of 45 mg/L, 233 lb/day
Total Coliform	Grab, collected at least daily	Compliance determined daily, based on the median value determined from the bacteriological results of the last 7 days for which analyses have been completed	*Same as Class A requirement.*	*Same as Class A requirement.*	*Not currently regulated by NPDES permit.*

Water Quality Monitoring Comparison	General Class A Reclaimed Requirements		Additional Requirements to Stillwater Wildlife Area		CWWTF
	Sample Type & Frequency	Compliance	Sample Type & Frequency	Compliance	Corresponding effluent requirements for discharge to the Snoqualmie River
Turbidity	Continuous recording turbidimeter	Filtered wastewater shall not exceed an average operating turbidity of 2 NTU, determined monthly, and shall not exceed 5 NTU at any time	*Same as Class A requirement.*	*Same as Class A requirement.*	One-day maximum turbidity allowed as a result of human actions of 5 NTU over background when the background is 50 NTU or less or a 10-percent increase in turbidity when the background turbidity is more than 50 NTU.
Dissolved Oxygen (DO)	Grab, collected at least daily	Shall contain dissolved oxygen	*Same as Class A requirement.*	*Same as Class A requirement.* *Also subject to Surface Water Standards due to hydraulic continuity with the Snoqualmie River (see CWWTF effluent limitations).*	Lowest 1-day minimum of 9.5 mg/L. When the DO in the water body is lower than 9.5 mg/L due to natural conditions, human actions considered cumulatively may not cause the DO of that water body to decrease more than 0.2 mg/L.
Total Kjeldahl Nitrogen (TKN)	*Not currently regulated.*	*Not currently regulated.*	24-hour composite collected weekly	Shall not exceed 3 mg/L as TKN-N on an average annual basis.	*Not currently regulated by NPDES permit.*
Total Ammonia-Nitrogen (NH_3)	*Not currently regulated.*	*Not currently regulated.*	24-hour composite collected weekly	Shall not exceed WA chronic standards for fresh surface water without use of a mixing zone unless net environmental benefit is demonstrated.	Shall not exceed WA surface water quality standards with anticipated allowable use of a mixing zone.
Total Phosphorus (P)	*Not currently regulated.*	*Not currently regulated.*	24-hour composite collected weekly	Shall not exceed 1 mg/L as P on an average annual basis.	*Not currently regulated by NPDES permit.*

Water Quality Monitoring Comparison	General Class A Reclaimed Requirements		Additional Requirements to Stillwater Wildlife Area		CWWTF
	Sample Type & Frequency	Compliance	Sample Type & Frequency	Compliance	Corresponding effluent requirements for discharge to the Snoqualmie River
Metals	*Not currently regulated.*	*Not currently regulated.*	24-hour composite collected weekly	Shall not exceed WA surface water quality standards without use of a mixing zone unless absence of toxicity or net environmental benefits is demonstrated.	Shall not exceed WA surface water quality standards with anticipated allowable use of a mixing zone.

* TSS sampling may be reduced for those projects generating Class A reclaimed water on a case by case basis by Health and Ecology.

Sources:

Washington Department of Ecology, *Washington Reclamation and Reuse Standards*, 1997.

Cosmopolitan Engineering Group, *Technical Memorandum No. 12 - River Outfall*, 2004.

Water quality standards for surface waters of the state of Washington, WAC 173-201A, 2003.